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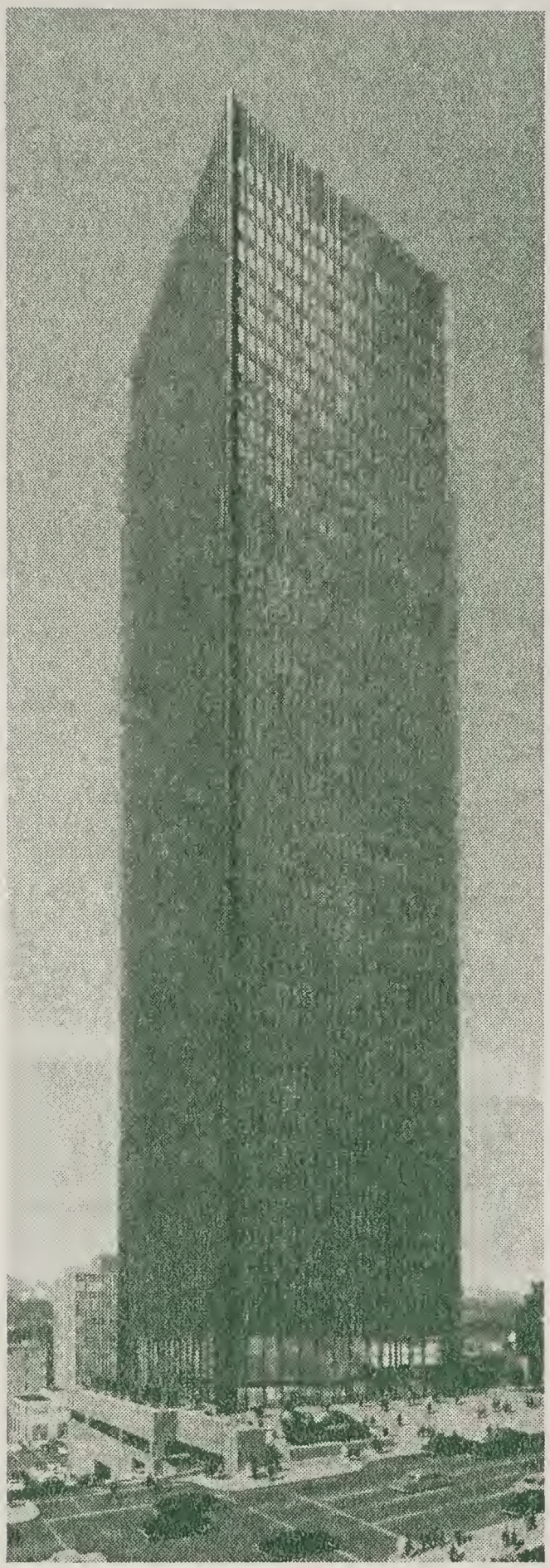

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THE UNIVERSITY OF WASHINGTON

Arboretum bulletin

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COVER PICTURE:

Prunus cerasifera atropurpurea

PHOTO BY: DON NORMARK

A Trail in the Olympics

Frances Kinne Roberson*

The experience of climbing from sea level to alpine heights in late July in the Olympic Mountains of Washington State may be likened to condensing at least two seasons of the year into the short span of a few days. Our trip was initiated by ferry across Puget Sound from Seattle and by car to Louella Guard Station in the valley of the Dungeness River. This account merely records general impressions in sequence along the route we followed without regard to time lapse and with no attempt to describe any great proportion of the wealth of plant life seen.

Conspicuous along the roadside as the approach to the trail began were many familiar plants. *Holodiscus discolor* varied from low scrubby bunches, where the impoverished soil and scarcity of water would support no lush growth, to bulky shrubs of many feet in height where better soil and more moisture encouraged growth. Then the leaves on the arching branches were almost hidden by the foamy cream of the myriad blossoms. Little wonder that Ocean Spray has long been the descriptive name of this shrub which so often flourishes on shore-side banks.

A blue-flowered composite, probably *Aster foliaceus*, hobnobbed with a more plentiful white one, *Anaphalis margaritacea* (Pearly Everlasting), in endless procession where the prospect was open and sunny. A fairly frequent sight, rising from this one or two foot cover, was a taller single stem or group of stems of *Lilium columbianum*. The orange flowers, much spotted with mulberry color and having well reflexed segments, varied from two to many in number and nodded on slender pedicels above the whorls of leaves on the stems.

Our route did not take us through much actual forest at this time but where there was some shade *Rhododendron macrophyllum* grew to considerable height, with spent blossoms already superseded by seed capsules at the tips of the sturdy branches which bore the long narrow and leathery leaves. This magnificent shrub accompanied our trail as long as we kept to lower elevations, but, as we reached its upper limits, trusses of pink to mauve flowers were displayed instead of the seeds. The constant reaching for sunlight meant that heights of 15 feet were not uncommon for this plant which is Washington's state flower.

But, still at roadside, herbaceous plants of note included a bright red to orange flowered paintbrush, possibly *Castilleja angustifolia*. Plants of *Linnaea borealis* struggled at ground level to thread their way through the miniature forest of bracken (*Pteridium aquilinum*). *Campanula Scouleri*, with its tiny pale blue flowers, grew no taller than the twinflower. The roots of the two plants intermingled as they crept about, even into the yellow gravel of the shallow culvert at the road's edge.

Gold Creek Trail led us from the guard station, sometimes through tall stands of conifers, mainly hemlock (*Tsuga heterophylla*) and fir (*Abies amabilis*), with little under the trees but forest duff except for an infrequent mat of *Chimaphila umbellata* (Pipsissewa) or *Pyrola secunda*, or an even less frequent clump of the ghostly white *Monotropa uniflora* (Indian Pipe).

Occasionally, when the trail kept to the open creek, there were mossy trunked maples (*Acer macrophyllum*), either with or without the adornment of *Polypodium vulgare* (licorice fern) on the trunk and lower branches.

A sizeable mass of *Sedum spathulifolium*

*It is a great joy to see Mrs. (L. N.) Roberson's name again topping our pages. Long a faithful member of our Editorial Staff her presence has been sadly missed. We welcome her return to the Bulletin.

attracted our attention as it grew in debris lodged on a rock, well exposed in midstream, the gray foliage all but hidden by the bright yellow flowers. A moss covered log, which lay partly submerged in the fast moving water, held a small garden of *Vaccinium parviflorum,* yellow flowered *mimulus moschatus,* and *Cornus canadensis* with its miniature dogwood blossoms. *Adenocaulon bicolor* flanked the stream and its large leaves flexed in the breeze to show the under side as well as the top so that we understood the nickname of Silvergreen.

The spindly trunks of *Acer circinatum* (vine maple) were as dappled with gray as were the foot thick ones of *Alnus oregona* (red alder) which towered to so much greater heights. Patches of sunlight frequently called attention to the prickly stems and leaves of *Oplopanax horridum* (devil's club.) That was close enough association! However, we sometimes overlook what a handsome plant this is.

An extended association of fragile *Dryopteris linnaeana* (oak fern) and coarser *Struthiopteris spicant* (deer fern) with strap leaved *Clintonia uniflora* was interrupted here and there by small patches of *Streptopus amplexifolius* (twisted stalk) or its much taller relative, *Smilacina stellata* (false Solomon's seal). These and many other lush plants predominated for a while and then we entered tall timber again, alternating thus several times until we reached and passed East Crossing Camp and made our way to Bungalow Creek River Camp which was at 2000 foot elevation.

Occasional plants of *Rhododendron albiflorum* appeared first, and then veritable thickets of them, nowhere nearly as tall as *R. macrophyllum* but yet as high as five or six feet. When we came upon them in flower at still higher elevations we usually

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Lilium columbianum, Mt. Townsend, Olympic Mts.

Fig. 1—Photo by: B. O. Mulligan

had first heard the buzz of insects, for they were greatly attracted by the creamy flowers.

Chamaecyparis nootkatensis (Alaska cedar) appeared ever more frequently, with its branches drooping as though the air was heavy enough to depress them.

A level meadow at Camp Handy abounded in *Polemonium pulcherrimum,* its characteristic Jacob's Ladder leaves surmounted by yellow-eyed, alice-blue flowers. These plants were scarcely lower growing than the invasive *Campanula rotundifolia* whose bell-shaped flowers were a much deeper blue. The bright red and yellow blossoms of *Aquilegia formosa* grew on still taller stems, bobbing about as they caught little gusts of wind. Scattered plants of *Viola adunca* added another blue note.

Some sunny parts of the subsequent trail brought us first sight of a thistle, *Cirsium edule,* which was thereafter conspicuous for some time by reason of its large rosy-pink flowers as well as because of its omnipresence. A few moist areas were covered with *Petasites frigidus* (coltsfoot). If the dull green leaves were disturbed we could see the contrasting gray of the reverse sides. An open grassy area looked as though it were peopled with ramrod straight sentinels of *Veratum viride* (False Hellebore), some of them topped by sparse plumes of greenish flowers.

Boulder Shelter sat in an open clearing at the 4730 foot level, among mounds of rock and huge boulders which gave the spot its name. This opening and a larger one close by were surrounded by tall firs. The deep rose bracts of *Castelleja oreopola* dominated the floral scene but, included in the abundance of plants on the rocky terrain, there were also species of penstemon, phlox and arnica. Small clumps of *Anemone drummondii* sat tight to the ground, mostly just in bud but occasionally with an open flower of white or lavender on a six or ten inch stem rising from almost woolly foliage. A plant with even grayer foliage was *Synthyris pinnatifida* var. *lanuginosa,* whose much dissected leaves differ so radically from those of some other species of synthyris, and whose blue racemes often try the patience of the color photographer. The purplish spikes of *Phacelia sericea* seemed fuzzy with their abundance of exerted stamens. It is equally hard for the photographer to catch the true color of these flowers.

Forest gave way to a sparse stand of individual trees on rocky talus slopes as we proceeded, even across a snow patch in one place, to Marmot Pass and on up to Buckhorn Mountain (elevation—6985 feet) where we found the spring season of the arctic-alpine zone in full sway. The stature of *Pinus monticola* decreased to that of a mere shrub at this elevation.

Cryptogramma acrostichoides (parsley fern) had wedged its roots ever tighter between the rocks as its dense tufts had increased in size. The intermittent downhill movement of rock had all but buried some of these clumps which were growing on the slope above our trail. Others flourished in crevices in low vertical rock faces.

Campanula rotundifolia still persisted but with shorter flower stems than before and with more condensed general appearance. A great delight was the first sight of *Campanula piperi,* a renowned endemic of the Olympics, whose dentate leaves appeared to be strung invisibly in the cracks in the rocks. This gem was not yet at the peak of its flowering season but an occasional blossom, strung along with the leaves, shone as a blue star.

A squat rose bush near the path bore two inch flowers of clear pink. Apparently it was *Rosa nutkana* which had occurred at lower elevations in small thickets several feet in height. The blossoms offered a heavenly fragrance when one could get close to them.

Bushlets of *potentilla fruticosa* (shrubby cinquefoil) were no more than a foot in height here and had begun to show their pale to bright yellow flowers. Sparsley flowered *Potentilla flabellifolia* flattened its pinate leaves to the ground as though ex-

pecting to derive some warmth from the rocky surface.

Little dwarfs such as *Antennaria lanata, Eriogonum ovalifolium* and *Smelowskia calycina* had somehow found a root-hold in the rock debris. Most plentiful of all were the stubby tufts of *Erigeron compositus* var. *trifidus,* each plant held firmly in place by a long tap root. The much dissected grayish leaves were matted at the base of four to six inch flower stems which held pink-rayed daisies, each less than an inch in diameter.

The primrose family was ably represented by *Douglasia laevigata.* The reddish flower stems were so short that the umbels of deep rose blossoms appeared to rest on the mass of tiny leathery leaves. As the season advanced, this characteristic would no doubt change. The stems would lengthen to hold the flowers an inch or so higher, which is the more typical habit elsewhere in the wild as well as in cultivation. Clumps varied from a few inches in diameter to a foot across. All the lax stems emanated from a central root system—another plant with an anchor.

Thin mats of *Luetkea pectinata* (Alaska spirea) spread their ferny foliage over rocky surfaces or grew into denser cover when creeping in the lee of scrub pine. A vast area had been preempted by great sheets of *Salix nivalis,* sometimes called Snow Willow. The size of the prostrate tree trunks was amazing. In what other manner than flat to the ground could willows survive on mountain tops and achieve such enormous growth! The shiny leaves were less than an inch in length. Smaller leaved *Salix arctica* grew in the same area.

The brightest green anywhere about was that of *Silene acaulis* which flourished in flat to rounded cushions in repetitious luxuriance. Its bright pink flowers, set tight to

(*Continued on Page 22*)

Potentilla fruticosa, Mt. Townsend, Olympic Mts., Wash.

Fig. 2—Photo by: B. O. Mulligan

Grow Your Own

Mae Granston*

In January 1964 I took a seed class at the University of Washington Arboretum. I have since grown many rhododendrons from seed, and find it a most rewarding experience. Some people seem a bit reluctant to try it, wonder why anyone should, feel that it is difficult, and that it takes a great deal of patience.

There are many good reasons for growing rhododendrons from seed. The hybridizer must. For another reason, and of most importance to the species collector, many, many of the species are simply not available, even in the specialty nurseries. For another, and equally valid reason, it is a fascinating hobby. It is a thrill to see that tiny seedling bloom in three or four years, and realize one *might* have a jewel. Patience is not a necessary requirement; these little fellows are generally a jump ahead of me and requiring attention before I have time to give it.

I sow seed as soon as I can get it, anywhere from December to May, but the sooner the better in order to get the maximum growth that critical first year. I only grow seed of the species, or of carefully controlled crosses. Some people maintain that only hand pollinated seed of good forms should be used. Perhaps I have been fortunate. Seed from open pollination has given plants of great uniformity, with only slight variations in color, size of blossom, or plant habit, with an occasional real dividend, such as a pink puralbum, or a smirnowii showing up in a batch of schlippenbachii. I couldn't care less if the pink puralbum is a chance hybrid—it is a gem.

Clear plastic containers, at least 2-1/2 to 3 inches deep, with tight fitting lids, are used for seed trays. One, 2-1/2 x 2-1/2 x 8, is made especially for this purpose, but a variety of sizes is available. It does not matter as long as it is sufficiently deep and has a tight lid.

After some experimenting, I believe a medium of one fourth to one third fine clean sand and fine peat moss to be about the best readily obtainable. This is mixed in a pan and thoroughly moistened at least a day before sowing, since peat is somewhat difficult to saturate. The mix needs to be wet, but not sopping; there should be no discernible water. This is then packed into the container to a depth of about one inch, and gently firmed and leveled. Tiny roots will not penetrate too compressed a medium, and simply run about on the surface. Anywhere from one to ten varieties may be placed in the same container, depending upon its size. Areas are divided off by plastic labels, laid on edge and partially pressed into the medium. A single kind to a container reduces the chances of accidental mixing of varieties and facilitates the first transplant, since varieties germinate and grow on at different paces. However, this is not alway feasible. The seed is then broadcast THINLY on the surface, by gently tapping the envelope, or from a creased piece of smooth, white paper. This is the most difficult part; some seed is so fine it is hardly visible to the naked eye, and I invariably sow some too thickly. Each variety is then labeled, with the date, again on a plastic label, with #2 lead pencil. Do *not* use a ball point pen or indelible pencil. The labels will fade or run in the humidity. Covers are put on tightly, the boxes are placed in good light, but NEVER where direct sun can hit, and more or less forgotten, except for occasional checking for mold or fungus. If this should develop, a light dusting of powdered

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*Mrs. (Ray) Granston is a valued member of our Unit No. 29, a Member of the Board of Directors and is currently Research Chairman on the Unit Council Governing Board.

Captan, kept handy in a kitchen salt cellar, will take care of it. There will be no need to water.

Records should be kept, in some sort of notebook, noting the kind, date, source of the seed, whether hand or open pollination, and any other pertinent information, such as rate of germination, when transplanted to flats, when to nursery beds, how many, first bloom and disposition of excess plants. This is most important and does not really take much time. One soon finds that memory is not reliable.

Viable seed will germinate in two to four weeks, but some varieties may take considerably longer. After two to four sets of true leaves have developed the lids are partially lifted and slid over, to allow air. More drying will occur now and the trays will need to be watched and turned, as the seedlings will turn toward the source of light. At this point one can give a half strength dilution of fertilizer. I use liquid fish. Mr. David Leach, author of "Rhododendrons of the World", recommends feeding every two or three weeks. In practical application I simply do not get around to this even every month. An ordinary bulb type kitchen baster is most handy for watering and fertilizing.

As soon as the seedlings are big enough to handle, they are transplanted into flats. Half-flats are more easily handled. Tomato crates make good substitutes. Here the medium must be porous, light and friable. A sifted good alder bottom loam, with much humus, is ideal. For safety's sake, I incorporate a generous dose of Soildusto. Lacking this good loam, I have had good results with about a half and half mix of sifted rotted wood and sifted garden soil. As a last resort, about a half and half mix of peat moss and our normally poor garden soil will do. The seedlings are placed about an inch apart in the flats. Patience does, indeed, enter the picture in this phase. Those too small to handle can be spaced back into the seed tray and left to grow on. Flats should be placed in a shaded location, after being carefully watered to settle the seedlings into place. They must not be allowed to become dry. A word of caution here—the neighborhood cats and squirrels will also find this nice porous material to their liking. It is a little sickening to find a flat of yakusimanum, for example, a complete shambles some morning. I am forced to put new transplants on a sundeck, or into coldframes under cover. If one can get these new transplants into growing medium by early June, it is safe to fertilize once. Most of my material has to winter over in covered but unheated cold frames, or in a well lighted outbuilding, so it is not advisable to stimulate growth after June.

The flats should be given as much protection as possible the first winter, although I have not lost any from freezing, which can happen even in a covered frame. They should not be subjected to hard, driving winter rains, which can flatten the seedlings and compact the medium.

The laggards can be transplanted at any time during the winter, but these are wintered over in a daylight basement. They do not seem to mind warm, dry house atmosphere, and, in addition, it is safe to periodically feed. Under these conditions the deciduous material does not lose it's leaves, but this does not seem to matter.

Normally the robust growers go into open nursery beds, following their first winter. They seem to stand still for a time, but literally explode into growth the third year and some will bloom. They are given no particular attention except the routine weeding, mulching and watering.

A few, such as the aggravatingly slow chrysanthum, and the dwarfs, can remain in the flats for the second year. They may be fertilized twice; once very early in the spring, before growth begins, and again in early June. A full strength dilution is used anytime after the first transplant. Shift flats occasionally. The roots of a neighboring mountain ash had invaded some flats and were literally sucking them

(*Continued on Page 23*)

Growth of Trees at Arboretum

J. A. Witt

The growth rate of ornamental trees, particularly the rate that they increase in height, is of very considerable interest to the horticulturist, gardeners, and especially the new home owners who must choose trees for their landscaping. In an effort to supply this information the Arboretum staff has, since 1954, been making more or less regular height measurements of certain selected trees throughout the grounds. The first record was published in mimeographed form in 1958 followed by another in 1962 (*Arboretum Bulletin, Winter, 1962*).

In 1959 the nurserymen in charge of planting young trees were asked to measure and record the heights of all the trees they put out in the Arboretum, a practice that is still being followed. We have compiled a new set of growth records using these planting heights and measurements made in the winter of 1966. These not only indicate how rapidly a young tree grows but also is an indication of how well it withstood the shock of transplanting.

It is interesting to note that among thirty three trees measured in 1954, 1958, 1962 and 1966 the growth rate of eighteen was greatest during the first four-year period, that is, from 1954 to 1958. Eight specimens grew at a greater rate between 1958 and 1962, and seven had their greatest growth between 1962 and 1966. The majority of these thirty-three were planted between 1947 and 1951. It is not yet clear how

Species	No. Meas.	1954
**Acer capillipes*	1	12
Acer cissifolium	2	----
Acer Davidii	1	14
**Acer griseum* paperbark maple	2	----
**Acer Grosseri* var. *Hersii* Hers' maple	1	----
**Acer Oliverianum*	1	----
Acer platanoides 'Crimson King' Crimson King maple	1	----
Acer platanoides 'Erectum' Erect Norway Maple	1	----
Acer rubrum 'Columnare' Columnar red maple	1	----
**Acer rufinerve* hybrid Redvein maple hybrid	1	----
Acer saccharum Sugar maple	1	----
Acer tegmentosum	1	----
Albizzia Julibrissin var. *rosea* Hardy silk tree	1	9
Alnus cordata Italian alder	1	----
**Alnus glutinosa* European alder	1	----
**Alnus japonica* Japanese alder	3	----
**Amelanchier X grandiflora*	1	----
**Betula Ermanii*	2	----
Betula papyrifera var. *commutata* Western paper birch	2	----
Betula pendula 'Fastigiata' Erect white birch	2	----
**Betula playphylla* var. *szechuanica*	1	----
Carpinus Betulus 'Fastigiata' Erect European hornbeam	1	----
**Carpinus caroliniana* var. *virginiana* American hornbeam	1	----
**Cercidiphyllum magnificum* Katsura tree	1	14
**Cercis chinensis* Chinese redbud	1	----
Chamaecyparis Lawsoniana 'Glauca' Blue Lawson's cypress	2	----
Chamaecyparis nootkatensis Alaska cedar	1	----
Cornus Nuttallii (grafted plts.) Pacific dogwood	3	14

this apparent slow-down in growth rate by over half the trees measured can be interpreted. Indeed these figures may prove misleading when more measurements are made, but it now appears that the most rapid growth tends to occur in the first ten years after planting, then begins to slow somewhat after that. We will be in a better position to judge if this is true when we have further figures on the plants set out since 1958.

The second list, growth of young trees planted since 1958, indicates that some of our newer trees are certainly growing at a very rapid rate. For instance, nine out of the seventy-two, or one eighth, grew a very respectable two feet or more per year. The speed champion was a Japanese alder, *Alnus Inokumae,* which grew seven and one half feet in a year. The second best was a poplar, *Populus tristis,* from Central Asia. This tree has averaged nearly six feet of growth per year for four years. It is very doubtful if these rates can be kept up over a longer period.

The slowest trees, those with an annual growth of less than a foot, are a bit more difficult to assess since there may be three reasons for such a slow growth rate. First, the species can be naturally slow; second, the site in which it is growing may not be to its liking. The third cause is often more evident, the top could have been broken or frozen back. These slow ones are in some ways as interesting to the horticulturist as the more rapid growers, since too often a quick growing tree is placed in a garden for immediate effect only to become a nuisance and even a threat in later years. How much better for all concerned if a slower growing specimen were chosen; hence the value of such lists as these.

Height in Feet to Nearest Half Foot				Date
1955	1958	1962	1966	Planted
---	21	23.5	23.5	4/51
10	14	15	20.5	4/53; 2/55
---	20	23.5	25	12/49
4	8	10.5	17.5	12/54
8.5	13	15	20	4/53
7.5	9	13	22	4/53
---	11	16	22	3/52
---	17	22	31	2/51
---	11	16.5	21.5	3/52
9	13	23	29	2/54
---	13	20	38	12/52
10.7	14	15	22	4/53
10	16.5	21	23	8/49
18.5	28	36	46	3/51
19	24	26.5	29	11/47
22	27.5	35.5	43	11/47
9	13	18	23	4/53
16	20	22	28	11/47
13.5	19	24	31	11/51
	11	21	27.5	4/57
21	23.5	23	38	11/47
---	7.5	14	19	12/56
4	10.5	12.5	13	1/52
17	22	25	33	12/48
6.5	9	11	13.5	2/53
---	8.5	16	23.5	4/56
---	5	9	17	3/57
---	18	27	34	11/49

Species	No. Meas.	1954
Crataegus monogyna 'Stricta'	1	----
**Cupressocyparis Leylandii*	1	6-7
Cupressus arizonica form Arizona cypress	2	----
**Davidia involucrata* Dove tree	3	----
Fagus sylvatica 'Laciniata' Cutleaf European beech	1	9
Fagus syivatica 'Rohanii' Rohan European beech	1	9
Franklinia altamaha Franklin tree	1	12
Gleditsia triacanthos 'Moraine' Moraine Locust	1	11.5x13
Halesia carolina Carolina silverbell	1	----
Ilex altaclarensis 'Camelliaefolia' Camellialeaf English holly	2	----
Ilex Aquifolium 'Angustifolia' Narrow leaf English holly	2	----
Ilex X Aquipernyi	1	6
Ilex integra	1	----
Ilex pedunculosa Longstalk holly	2	8
**Laburnum alpinum* Scotch laburnum		10
Liriodendron tulipifera Tulip tree	1	----
**Maackia amurensis* var. *Buergeri*	1	9
Maackia chinensis	1	9.5
**Magnolia acuminata* Cucumber tree	2	17
**Magnolia Fraseri* Fraser's magnolia	3	17
**Magnolia Kobus*	3	12
Magnolia Kobus var. *borealis*	1	21
Magnolia obovata Whiteleaf magnolia	1	10
Magnolia salicifolia Willowleaf magnolia	1	10
Magnolia Sargentiana var. *robusta*	1	----
Magnolia virginiana Sweet bay	3	9
Malus 'Dolgo' Dolgo crabapple	1	----
Malus 'Frau Luise Dittmann'	1	
Malus X Hartwigii	2	
Malus X magdeburgensis	2	
Malus 'Wabiskaw'	1	
**Metasequoia glyptostroboides* Dawn redwood	1	
**Nyssa sylvatica* Tupelo	3	----
**Nothofagus Dombeyi* Dombey southern beech	1	6
Nothofagus obliqua	2	10
Oxydendrum arboreum Sourwood	1	10
Paulownia tomentosa 'Lilacina'	1	----
Pinus aristata Bristlecone pine	3	----
**Pinus Armandii*	1	11
**Pinus Banksiana* Jack pine	1	17.5
Pinus densiflora Japanese red pine	1	13
Pinus Griffithii Himalayan pine	1	----
**Pinus nigra* var.*cebennensis* Cevennes pine	2	12
**Pinus Pinaster* Cluster pine	2	5
**Pinus sylvestris* var. Silver scots pine	1	7.5
**Pinus virginiana* Scrub pine	1	10
**Prunus Grayana*	3	----
Prunus Hillieri Hillier cherry	1	----
**Prunus mandshurica* Manchurian apricot	1	8.1
Prunus subhirtella var. *rosea* Whitcomb cherry	1	22x30
**Quercus macrocarpa* Bur oak	1	----
Robinia X ambigua 'Decaisneana' Decaisne black locust	1	32

Height in Feet to Nearest Half Foot				Date
1955	1958	1962	1966	Planted
	9.5	13.5	17.5	4/56
9	15	25	33.5	12/52
	6.5	17	28	11/57
6.5	4.5(f)	9.5	14.5	12/51
	16	20	26	11/49
	14.5	19	21.5	2/50
	14	17	18	Spring 1949
	18.5x20	22x29	22x30	11/49
23	26.5	30	36	Spring 1947
9.5	12.5	17	20	1948
7.5	10.5	14	15	1948
7	11	13.5	17	10/49
9	11	11	12	3/49
9.5	15	17.5	18	3/49
13	15	17.5	20.5	3/50
	11	21	27	4/57
12	15.5	16	26	5/48
12	11.5	21	22.5	5/48
18	23.5	29.5	34.5	11/46
19	24.5	28	34	4/48
14	23	26	29	3/48
	31	32	40	1947
	18	23	29	11/48
11.5	13.5	18	21.5	4/48
4.5	5.5	12	17	2/54
11.5	13	14	14.5	1947
	6	12	18.5	12/57
	14.5	18	22	3/55
	9.5	13.5	20.5	3/55
	10.5	13	19	4/56
	12	20	23	2/57
3(1956)	18.5	21.5	35	5/56
	11.5	18	24	3/53
	13.5(f)	26	36	3/53
	14	25.5	31	3/52
14	19	24	28	3/49
	19	27	35	3/51
	4	5	6	3/57
	17.5	21	29	11/47
	23.5	31	36	11/47
(lost leader)	14	21	24	11/47
	7.5	12.5	23	3/57
15	14.5	21	27	4/48
	11	18.5	27	11/51
	20	26.5	33	11/48
	14	21.5	25.5	11/47
	8	13	21.5	3/57
	10	19	23.5	11/57
13	16.5	18	18.5	2/51
	22x30	23.5x41	25.5x36+	3/49
	15	18	28	4/55
	36	46	48	5/48

Species	No. Meas.	1954
Robinia viscosa Sticky locust	1	20x16
Salix alba 'Tristis' Weeping willow	2	----
Stewartia ovata	1	12
Stewartia pseudocamellia	1	18
Stewartia pseudocamellia var. *koreana*	1	10
Stryrax Obassia Fragrant styrax	1	16
**Tillia platyphyllos* Bigleaf linden	1	----
Tsuga Mertensiana Mountain hemlock	3	9.5
**Tsuga Sieboldii* Siebold's hemlock	1	9

*Raised from seed at Arboretum.
(f) Frozen back in November 1955
+ Tree diseased.

Growth of Young Trees in Arboretum, Planted Since 1958

	No. Meas.	Date Pltd.	Height at Planting Time	Ht. 12/66
Abies bracteata	3	2/60	2.5′	8′
Abies chensiensis	1	1/62	3′	7.5′
**Abies Ernestii*	1	11/60	3′	9.5′
**Abies firma*	1	2/59	4′	7.5′
Abies lasiocarpa var. *arizonica*	1	12/58	2′	15′
Aesculus Hippocastanum 'Baumannii'	1	2/61	9.5′	11′
**Aesculus indica*	1	2/60	3′	9.5′
Aesculus neglecta var. *georgiana*	1	12/60	5′	8.5′
**Amelanchier arborea*	2	12/61	7.5′	13′
Amelanchier humilis (spicata)	1	1/62	7.5′	15′
**Cedrela sinensis*	1	2/63	6′	6′ (d)
Cephalotaxus Harringtonia	1	11/60	3′	5′
Cercis racemosa	2	12/60	4′	11.5′
**Chamaecyparis obtusa*	3	2/59	4′	13′
**Corylus Sieboldiana*	1	10/59	5′	6.5′
Crataegus pinnatifida	1	2/59	10′	21′
Crataegus punctata 'Aurea'	1	2/59	6′	16′
Cryptomeria japonica 'Elegans'	1	11/60	2′	10′
Cunninghamia lanceolata	1	11/60	2′	10.5′
**Cupressus sempervirens*	1	3/61	3′	14′
**Eucalyptus niphophila*	3	6/61	5′	18.5′
**Fagus orientalis*	1	12/62	3′	11.5′
**Fraxinus longicuspis*	1	1/62	4.5′	14′
Fraxinus Ornus	2	1/62	3′	7′
Gleditsia japonica	1	2/63	6.5′	10.5′
**Hovenia dulcis* var. *koreana*	1	2/63	9′	13′
**Juniperus chinensis* (ex Korea)	1	5/60	3′	10.5′
**Juniperus scopulorum*	1	5/60	4′	8.5′
**Kolreuteria paniculata*	3	3/59	4.5′	10′
**Larix Kaempferi*	4	3/61	3′	18′
**Larix laricina*	1	3/59	3.5′	14′
**Larix polonica*	3	12/62	4′	17′
**Liquidambar orientalis*	1	11/61	7′	11′
Lithocarpus densiflora	1	3/61	3′	7′
Mella Azedarach	1	5/60	4.5′	10′
**Nyssa aquatica*	2	11/59	4′	8′
**Parrotiopsis Jacquemontiana* (ex Kashmir)	1	4/62	6′	7′
Photinia X Fraseri	2	3/61	3′	9′

Height in Feet to Nearest Half Foot 1955	1958	1962	1966	Date Planted
18x16	17x22	20x26	21x29	3/50
----	13	24	43.5	4/57
13.5	13	16	17	Spring 1948
21	22.5	25.5	27	3/48
12	15.5	21	24	3/51
17	19	21	24	3/48
----	7.5	15.5	23	11/57
----	12	17	20.5	2/51
11	9(f)	17	23	3/49

	No. Maes.	Date Pltd.	Height at Planting Time	Ht. 12/66
**Picea gemmata*	1	11/60	3′	13.5′
Picea Glehnii	1	2/60	3′	8.5′
**Picea morrisonicola*	1	2/59	3′	13′
Picea Smithiana	1	2/60	2.5′	7′
Populus Maximowiczii	1	12/60	12.5′	28.5′
Populus tristis	1	3/62	4.5′	28′
Prunus americana	1	12/58	4′	8.5′
**Prunus Conradinae*	1	2/60	7.5′	19′
Prunus X incam 'Okame'	2	11/61	7′	17′
Prunus serrula	1	11/61	8′	13′
Prunus yedoensis 'Akebono'	1	4/63	9′	10′
Pseudotsuga macrocarpa	1	10/60	4.5′	9′
**Pterocarya fraxinifolia*	1	12/61	4′	7.5′
Pterostyrax corymbosa	1	12/60	9′	10′
Quercus chrysolepis	1	3/63	6′	11.5′
**Quercus gilva*	1	3/61	1.5′	3.5′
Quercus palustris	1	12/63	5′	7′
Quercus rubra	1	11/62	7′	13.5′
Quercus X Turneri	1	3/60	5′	21′
Rehderodendron macrocarpum	1	4/61	6′	9.5′
Sorbus Aria 'Majestica'	1	4/59	7′	17′
Stewartia serrata	1	2/63	4.5′	12′
**Taxodium distichum*	2	10/59	4′	10′
**Thuja koraiensis*	1	4/61	3.5′	12′
**Thuja orientalis*	2	3/59	6′	13′
Ulmus americana	1	3/60	3′	13.5′

(d) Leader damaged
* Raised from seed

A BONSAI EXHIBIT will be presented May 23 through May 26—sponsored by The Kelly Nishitani, The Mary Maki Arboretum Units and the Men's Bonsai Group—co-sponsored by the Seattle Art Museum. The Exhibit will be held in the main South Gallery of the Art Museum.

Flowering Cherries on Azalea Way

I saw the cherries dancing down the Way;
Of sun and wind and rain they seemed to sing;
With down-turned arms and dainty sober
grace,
Of tossing heads and rosy skirts a-swing,
Each one was trying vainly to keep pace
With Nature's footsteps quickening into
Spring. —M.W.B.

Unusual and Dwarf Conifers at the U. S. National Arboretum

T. R. Dudley*

Very often the term "dwarf" conjures up a vision which infers being deformed, abnormal, and perhaps ugly. A visit to the Gotelli collection of dwarf and slow-growing conifers at the United States National Arboretum in Washington, D.C. will immediately dispel this feeling. Visitors will be astonished by the collection's immense educational value and intrigued by the more than 800 varieties and species seen there. Certainly unusual, but extremely attractive and versatile, the 1500 naturally dwarf and slow-growing evergreens landscaped in a series of irregular and circular borders and island beds on an undulating terrain of about 5 acres, present a year-long tapestry of texture and color which is unequaled anywhere in the United States.

The collection was started in the late 1940's as the private hobby of Mr. William T. Gotelli of South Orange, New Jersey, a gentleman with an unusal enthusiasm for gardening. At the inception, and for a number of years subsequent, much of the material acquired was unavailable commercially in this country, either wholesale or retail. Mr. Gotelli traveled the world over following leads for new and unusual conifers. He imported plants from private gardens and estates, parks, nurseries, botanic gardens and arboreta in Canada, Europe, Japan, Australia and New Zealand. His extraordinary eye for "picking up" new and unusual items helped amass in a period of about 15 years a collection of 1500 plants representing 30 genera and 816 species and varieties. This remarkable collection was landscaped around his home until 1962, when he generously donated it to the people of the United States, specifically to be moved and established at the U.S. National Arboretum.

The monumental task of moving the plants from New Jersey to Washington took all of the fall and winter of 1962. The original stone work and the irrigation system used at the South Orange site were also transferred to the Arboretum, along with numerous pieces of statuary. Mr. John Jennings of Summit, New Jersey, the landscape architect who supervised the planning and design of the collection in New Jersey, and who accompanied Mr. Gotelli on several of his collecting trips in the United States and abroad, assisted with the design and planting of the collection at the new Arboretum site.

The collection then contained over 40 named slow-growing and diminutive varieties of firs (*Abies*), over 40 of true cedars (*Cedrus*), almost 30 Japanese cedar (*Cryptomeria*), almost 150 of False Cypress (*Chamaecyparis*), over 100 of Junipers (*Juniperus*), over 120 of spruces (*Picea*), approximately 100 of pines (*Pinus*), over 20 of Yews (*Taxus*), over 40 of Arborvitae (*Thuja*), and 60 of Hemlock (*Tsuga*). Also contained in the original collection were about 50 miscellaneous evergreens including rare species and varieties of the Tasmanian Cedar, *Athrotaxis* and *Microcachrys* from Tasmania, *Phyllocladus* from New Zealand, *Fokienia*, Plumyew (*Cephalotaxus*), Dawn Redwood (*Metasequoia*) and *Keteleeria* from China, *Torreya* and Japanese Umbrella Pine (*Sciadopitys*) from Japan, Monkey Puzzle or Chilian Pine (*Araucaria*) from the South American Andes, Incense Cedar (*Libocedrus*), Baldcypress (*Taxodium*) and Arizona and Monterey Cypress (*Cupres-*

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sus) from the United States, Douglas Fir (*Pseudotsuga*), Redwood and the Big tree (*Sequoia* and *Sequoiadendron* respectively) and the Broad-leaved Arborvitae (*Thujopsis*) from various sources in the United States and Europe, and *Podocarpus* from Tasmania, Australia, New Zealand and Japan.

In addition to the rare conifers, Mr. Gotelli also donated to the National Arboretum his horticultural library, which consisted of 300 volumes, and about 500 specimen-sized plants. These supplemental plants, among them Azaleas, Rhododendrons, Maples, Dogwoods, Gingkos and Cotoneasters, have been used to accent and implement the design of the Gotelli area at the Arboretum.

The Gotelli collection was officially accepted by the U. S. Department of Agriculture in the fall of 1963, and ultimately opened to the public in the spring of 1964, at the same time that the new administration building of the National Arboretum was dedicated.

Following the pattern established by Mr. Gotelli at the New Jersey site, much of the planting at the national Arboretum is mulched with "blue-stone" chips. This medium is effective in providing a contrasting surface color and texture. It also cools the soil during the summer months and alleviates many weed problems. A second mulch of black polyethylene film is applied to the soil surface before the blue-stone" chips are put down. The polyethylene film further conserves soil moisture around the plants, cuts down significantly on weed growth, and yet allows satisfactory soil aeration.

Well drained and slightly acid to neutral soils and full sun are the general rules for most dwarf types. The Canada Hemlocks (*Tsuga canadensis*), however, prefer partial shade. Insects and diseases are not serious problems for dwarf conifers, although the Spruce and False Cypress may become afflicted with mites (red spiders) and the young growth of pines may become infested with aphis. These problems may be completely controlled with appropriate insecticides. Dwarf and slow-growing conifers *should not be fertilized.* Enriching the soil will often cause the plants to commence rapid growth, a feature which will detract from their natural character and intended use. Dwarf conifers are best transplanted when they are semi-dormant or dormant, in the months of October through March.

As opposed to the artificially manipulated, slow-growing Bonsai subjects, naturally slow-growing "dwarfs" or "lilliputs" require little care and trimming to maintain their characteristic shape for many years. The tallest plant in the Gotelli collection today is the glaucos form of the Atlantic Cedar (*Cedrus atlantica* 'Glauca') which is 34 feet high; the pendulous Canada Hemlock (*Tsuga canadensis* 'Pendula') has the widest spread of 17 feet. Some items 25 years old or more are still only a few inches tall, and some the same age are slightly more than 5 feet in height.

What are the most outstanding or striking plants in the Gotelli collection? Some would say the very rare Pygmy Deodar Cedar (*Cedrus deodara* 'Pygmaea') which grows less than 1/4 inch a year. It was found about 25 years ago as a seedling mutation in a California nursery. Others might say the graceful weeping Serbian Spruce (*Picea omorika* 'Pendula'). Although not truly a dwarf, it is relatively slow-growing and may be expected to attain a maximum height of 80 or more feet at maturity.

To say that any individual plant is the "Best" or "Most Outstanding" would be misleading. The concepts of quality and beauty are in the eyes of the beholder. The manner and geographic area in which a plant is to be used should always govern the gardener's choice. For example, *Sequoia sempervirens* 'Albo-spica', a variety of the California Redwood, is an excellent subject for large rock garden planting. It is a glorious, spreading and multiple stemmed plant bearing creamy white young shoots. However, it will not survive

if planted very much north of Philadelphia. Similarly, many of the firs will not thrive in the southeastern or southern United States or in metropolitan areas where the air is heavily polluted.

Due in part to Mr. Gotelli's singular efforts and the re-location of the collection at the National Arboretum, a research and display institution, dwarf and slow-growing conifers are coming into their own for landscape purposes in this country. Through its cooperative program with botanic gardens, arboreta and nurserymen, the National Arboretum, in fulfillment of its responsibility to the American public, has distributed within the last 5 years several thousand scions and cuttings of many hundred varieties of these plants. Due to the limitations of stock, further propagations cannot, unfortunately, be supplied by the Arboretum on direct request.

Some of the named items in the Gotelli collection are not, even now available commercially; however, many propagators and nurserymen have remarkably excellent collections. Obviously, not every plantsman specializing in dwarf and slow-growing conifers has everything in the Gotelli collection. Often many have their own selections and introductions not yet represented in the Gotelli collection at the National Arboretum.

Other botanic gardens and arboreta are also endeavoring to propagate and distribute many more species and cultivars (horticultural varieties) than were available ten years ago. What were once rarities, often existing only as one or two specimen plants in private collection or specialized plantings in botanic gardens and arboreta are now becoming familiar to many of us. This vogue is enhanced by a current and growing garden renaissance, and the advent of gardens with limited planting and expansion potential. Gardeners, nurserymen and lanscape architects have naturally and quickly come to recognize the beauty, utility and versatility of dwarf and slow-growing conifers for use in landscaping small properties. They will stay at a desired height without pruning and will not outgrow space limitations. Thus they provide an almost unequaled assemblage of form, size, color and texture for permanent year-round evergreen pleasure that cannot be duplicated by any other plant material.

The following discusses a few representatives in the Gotelli collection currently being listed by commercial sources for landscape planting. Only a few from each conifer genus are included. Many more are available, and as awareness of their immense value increases, it is probable that all species and varieties in the collection will be obtainable.

The Firs (*Abies*) represented in the collection are from many sources in the United States, Canada, England, Germany and Japan. There are pendulous, dwarf or slow-growing varieties of European Silver Fir (*alba*), Balsam and Fraser's Balsam Fir (*balsamea* and *fraseri*, respectively), the Colorado Fir (*concolor*), Korean Fir (*koreana*), Caucasian Fir (*nord-*

The dark green, close-pyramidal 'Mounteneer' of *Juniperus scopulorum* complements well the silvery gray form of similar habit called 'Gray Gleam'.

Fig. 3—Photo by: Mr. Bert Lexen,
Silver Spring, Md.

mamniana), Vancouver Fir (*grandis*), Spanish Fir (*pinsapo*), Sacchhalin Fir (*sachalinensis*), Veitch's Fir (*veitchii*), Pindrow Fir (*pindrow*) from the Himalayas, Noble Fir (*procera*), Nikko Fir (*homolepis*), and California Red Fir (*magnifica*). In addition, there are plants of Ernest Fir (*ernestii*), Farges Fir (*fargesii*), Faber's Fir (fabri), Faxon's Fir (*faxoniana*) Maries Fir (*mariesii*), *recurvata*, Flaky Fir (*squamata*), all from China, Pacific Silver Fir (*amabilis*), Greek Fir (*cephalonica*), Manchurian Fir (*holophylla*), Sicilian Fir (*nebrodense*), Cilician Fir (*cilicica*) from the Taurus Mountains in Turkey, Japanese or Momi Fir (*firma*), Formosan Fir (*kawakamii*), the very rare Morocco Fir (*marocana*), Vilmorin's Fir (x *vilmorinii*), an artificial hybrid from France, and *bracteata* from California.

A very handsome, horizontally branched form of the Korean Fir (*koreana*) called 'Prostrate Beauty' is leaderless, and almost prostrate. It originated in a nursery in the Netherlands, and was obtained from the Morton Arboretum in Lisle, Illinois in 1958. Now 12 inches high, it has a spread of 18 inches. Erect and attractive violet-blue cones should be produced young in life. A dwarf Colorado Fir (*concolor*), 'Compacta Glauca', has a compact, irregular outline and long, stiff very silvery needles.

The four known species of true Cedars (*Cedrus*)—the Atlas, the Cyprus, the Himalayan and the Lebanon—are present in the collection together with numerous dwarf and color forms of each. One of the most striking is a dwarf Cedar of Lebanon (*libani*) called 'Nana'. It has a compact, pyramidal habit and very densely clustered, short needles.

Many varieties of the dwarf Cryptomerias or Japanese Cedars are commercially available on the West Coast and, hopefully, will be available soon in other parts of the country. The most popular and effective rock or small formal garden subjects are 'Pygmaea', which turns reddish in the winter, 'Vilmoriniana' and Compressa'. The last two slow-growers were brought from Japan, are dense and globular in shape and can be expected to attain a height of 2 to 3 feet. Cryptomerias are excellent for southeastern gardens and some areas of the West Coast, but are subject to severe winter-burn in the northeast.

Mr. Gotelli amassed an amazing number of unusual dwarf and slow-growing forms of Retinospora or False Cypress (*Chamaecyparis*), mostly from Germany, Great Britain, the Netherlands and New Zealand. Lawson False Cypress or Port Orford Cedar (*lawsoniana*) is, of course, a native tree of southern Oregon and northern California; however, most of the varieties were selected and introduced first in Great Britain and the Netherlands, then brought to the United States where they are currently enjoying considerable popularity.

Although somewhat tender, one of the finest of the Lawson False Cypresses is 'Witzeliana' with densely crowded and ascending or erect branches. Its maximum height is 5 feet. Excellent subjects for general landscaping and specialized purposes

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One of the bluish forms of firs in the *Abies procera* 'Glauca'. Although not really a dwarf, it is relatively slow-growing, had an interesting, irregular, but dense pattern of branching and will bear cones early in life.

Fig. 4—Photo by: Mr. Bert Lexen
Silver Spring, Md.

are 'Filiformis Compacta', a thread-leaved type having dark bluish-green foliage, and a low, globose habit which is often broader than tall; 'Nana', a good conical form; and the very lovely columnar types with green, blue, yellow or even whitish foliage, 'Lane', 'Lombartsii', 'Fletcher's White', and 'Fletcheri'.

One of the smallest conifers in existence is 'Caespitosa' of the Hinoki False Cypress (*Chamaecyperis obtusa*). The plant in the Gotelli collection is an original from the Red Lodge Nursery in Southhampton, England. Plants 15 or more years old are densely tufted cushions not more than 5 inches broad and 2-3 inches high. 'Kosteri' is another *obtusa* with considerable appeal. It produces a loosely compact pyramid ultimately 4 feet high. Each foliage spray is twisted and tufted, producing a most unsusual effect. Several older, entrancing favorites originating in Japan are 'Ericoides', a densely branched, conical shrub with light green juvenile foliage; 'Filicoides', a more robust plant with somewhat twisted foliage accompanied by flat, fern-like sprays; and 'Lycopodioides', a globose shrub having dark green and densely crowded foliage, the tips of which are like cockcomb. A pale to butter-yellow dwarf variant is provided by 'Lycopodioides Aurea.'

The common squarrose (entirely juvenile, soft to the touch foliage), plumose (mixed juvenile and mature, prickly foliage) and the thread-leaved types of the Sawara False Cypress (*Chamaecyparis pisifera*) are well-known in this country. Although inclined to be tender, 'Plumosa Rogersi', is an excellent dwarf conical plant with golden-yellow foliage. 'Golden Spangle" is a pyramidal gem with bright golden-yellow, thread-like foliage. Of the very pygmy forms, one of the best is 'Boulevard', which originated in a nursery in Newport, Rhode Island. It grows as a small pyramid and is soft, silvery grayish-blue.

Several dwarfs of the Alaskan Cedar or Nootka False Cypress (*Chamaecyparis nootkatensis*) and the White Cedar or Atlantic White Cedar (*Chamaecyparis thyoides*) are in the Gotelli collection. The interesting White Cedar, 'Ericoides', produces a close-growing cone of dark grayish-green juvenile foliage that becomes deep purple to violet in the winter.

The genus of Junipers (*Juniperus*) is very large and one of the most versatile of evergreens for landscape purposes. It contains hundreds of rewarding dwarfs and slow-growers. Many belonging to the Chinese Juniper (*chinensis*), the Common Juniper (*communis*), the Creeping Juniper (*horizontalis*), the Japgarden Juniper (*procumbens*), the Savin Juniper (*sabina*), the Single-seed Juniper (*squamata*), the Rocky Mountain Juniper (*scopulorum*), the Shore Juniper (*conferta*), the Himalayan Juniper (*recurva*), the Western Juniper (*occidentalis*) and the Red Cedar or Eastern Red Cedar (*virginiana*) are all to be seen in the Gotelli collection.

In the hybrid juniper (x *media*), a cross between the Chinese (*chinensis*) and the Savin (*sabina*) Junipers, 'Blaauw' is an unusual spreader with feathery, spray-like foliage. The prostate creeper 'Blue Cloud' has steel blue, thread-like foliage. A spectacular, very slender columnar form of about 10 feet ultimately is 'Obelisk', Its foliage is very dense and a bluish-white.

The very dwarf forms 'Hemisphaerica' and 'Echiniformis', pertaining to the Common Juniper (*communis*), only grow 1/4 1/2 inch annually and produce globose, almost spherical cushions up to 6-8 inches high and across. They are used effectively as container plants.

The flattened and creeping forms of *horizantalis*, such as 'Bar Harbor', 'Wiltonii' and 'Douglasii' (the Waukegan Juniper), are now old favorites among gardeners. A few years ago, the Plumfield Nurseries in Fremont, Nebraska, selected and introduced 'Filicinus' and 'Filicinus Minimus'. Both are extremely beautiful and have the finest textured foliage of all Junipers. They are slow-growing and prostrate, up to 4-6 inches tall, and have delicate, lacy, fern-

like, greenish-blue foliage, turning purplish-blue in the winter. 'Blue Horizon' is another creeper deserving more attention.

The single-seed Juniper (*squamata*), a native of Asia from Afghanistan to Formosa is naturally slow-growing and prostrate. E. H. Wilson of the Arnold Arboretum collected in China a low, spreading, horizontally branched form with wide sprays bending downward at the tips. It was named 'Prostrata'. 'Meyeri', of the same species, was also found in China by the famous U.S. Department of Agriculture Plant Explorer, Frank N. Meyer. Of bushy habit, it produces a large and luxuriant shrub having bluish-gray, dense foliage gracefully curled at the tips.

A large number of selections of the Rocky Mountain Juniper (*scopulorum*) have been named. Although slow-growing, most are pyramidal or columnar in habit and not really dwarfs. 'Gray Gleam', 'Kenyoni,' 'Mounteneer', 'Springtime' and 'Platinum' are a few exceptionally fine forms, and with silvery or silvery blue foliage. A prostrate, creeping type is the bluish-green 'Repens'.

Juniperus virginiana 'Skyrocket', with a good glaucous color, is probably the narrowest columnar evergreen known. It warrants attention as one of the most distinct of the junipers. As a possible hybrid between the Eastern Red Cedar (*virginiana*) and the Pfitzer Juniper (*chinensis* 'Pfitzeriana'), 'Gray Owl' is slow-growing and spreading with soft, silvery gray foliage tinged purple in the winter. A compact, 2-3 foot, perfectly rounded shrub is found in 'Globosa'. Its crowded foliage is rich green, turning brown in winter.

In the Norway Spruce (*Picea abies*), 140 cultivars and forms have been described. At least fifty of these are in the Gotelli collection and are available from several growers. Some of the most interesting and effective of the prostrate or spreading types of the Norway Spruce include 'Ellwangeriana,' 'Tabuliformis', 'Procumbens', 'Prostrate', and 'Pumila'. Among the smaller globose ones, usually as tall as they are broad, 'Echiniformis', 'Gregoryana', 'Pygmaea', 'Highlandia' and 'Humilis' are the most exciting. Some of the mound-forming or flattened types, generally broader than tall, are 'Clanbrassiliana', 'Sherwoodii', 'Knaptonensis', 'Maxwellii' and 'Nana'. The conical or pyramidal types include 'Barryi', 'Microsperma', 'Ohlendorffii', 'Remontii', 'Mucronata', 'Compacta' and 'Compacta Asselyn'. Pendulous slow-growers such as 'Pendula' and 'Inversa' are highly unusual. 'Compacta' has a fine, compact and conical habit, crowded branches and glossy bright green needles. The habit of 'Compacta Asselyn', with shorter needles, is similar, but is even denser.

Other Spruce species which may be observed and studied in the Gotelli collection are: Colorado Spruce (*pungens*); Black Spruce (*mariana*), native in the United States; Siberian Spruce (*obovata*); Serbian Spruce (*omorika*); Schrenk's Spruce (*schrenkiana*) of Central Asia and Turkestan; Eastern or Oriental Spruce (*orientalis*); Indian or Himalayan Spruce (*smithiana*); Sitka Spruce (*sitchensis*) from Alaska to northern California; Canadian or White Spruce (*glauca*) from the United States and Canada; Alcock's Spruce (*bicolor*) from Japan; Brewer's Weeping Spruce (*breweriana*) from northern California and southern Oregon; Engelmann's Spruce (*engelmannii*) from western North America; Saghalin Spruce (*glehnii*); Hondo variety of the Yeddo Spruce (*jezoensis* var. *hondoensis*) from Japan; x *hurstii*, a hybrid between Engelmann's and Colorado Spruce; Japanese Bush Spruce (*maximowiczii*); and Mt. Morrison Spruce (*morrisonicola*) from Formosa. In addition, there are plants of Wilson's Spruce (*wilsonii*), *brachytyla*, Chinese Dragon Spruce (*asperata*), *gemmata*, Meyer's Spruce (*meyeri*), *likiangensis* var. *urpurea*, *retroflexa*, and Candelabra Spruce (*montigena*) all from China.

There are many notable dwarf and slow-growing forms of the Colorado Blue Spruce (*pungens*). A very desirable compact and

(*Continued on Page 24*)

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To keep membership in the Arboretum Foundation in good standing, dues should be paid during the month payable. Active memberships more than three months in arrears will be dropped and The Bulletin will be discontinued.

MEMBERSHIP BLANK

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University of Washington Arboretum
Seattle, Washington

I hereby apply for membership in the Arboretum Foundation and remittance for same is enclosed to cover dues for the next succeeding 12 months.

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All memberships are non-assessable.

MRS. FRED G. CLARKE

In the passing of Mrs. Mabel Clarke, Feb. 16th, the University of Washington Arboretum has lost one of its most dedicated supporters, and members of the Arboretum Foundation have lost a friend who gave freely of her knowledge and wisdom. She was in love with Nature—its music—its land and water, and all things of the soil. A seed of the tallest tree or the tiniest flower offered a challenge to her, and found a place in her lovely garden—a garden which began in 1908 when she came to Mercer Island from her native Iowa. A special corner of this garden is filled with Iowa native trees and wild flowers raised from seed. Many of the trees in the garden were planted in honor of, and named for members of her family and friends. One Mountain Ash was given to her as a seedling by Frances MacBride in 1914 and bears the name "Frances, Marie and Helen" for the three sisters.

In the early days of the Arboretum Foundation, Mrs. Clarke raised a special Helleborus niger "Jean Pacheau"—sold the plants, payment for which she bought memberships for people she thought would continue as members. Through Unit 9, an inactive unit, she brought many members into the Arboretum. Many of these were charter members of Unit #41 when it was organized in 1951 and named in honor of Frances MacBride. During the years since this Unit has been active, Mabel has always come to the meetings laden with sprays of blossoming shrubs, and flowers from her garden—and a wealth of cultural information.

Mrs. Clarke was a singer, and life long member of the Ladies Musical Club, and music was an integral part of her life. She always attended "Work and Fun" days at the Arboretum and often would lighten the work of others with her whimsical philosophy or an impromptu song. She was always an inspiration and joy to all who knew her. It was an ending to a full and gracious life that she attended a concert

and found Spring iris blossoms in her garden just a few hours before she may have remembered the poem "life" – "Say not Good-night – but in some brighter clime – Bid me Good morning." –Irene Bunker

---

Year End Flowering Census - 1967

As in past years the Arboretum's staff has made a census of plants flowering in the Arboretum during the Christmas-New Years holiday period. The list below reflects the cool weather conditions that prevailed in late fall and early winter 1967. It contains only some thirty-eight species and cultivars. In the past few years the list has been much longer and included one or more *Arctostaphylos* species, *Erica lusitanica*, the Portuguese heath, several rhododrendrons and assorted herbaceous plants.

Acacia retinodes water wattle
Alnus spectabilis hybrid alder
Arbutus Unedo strawberry tree
Camellia 'Apple Blossom'
Camellia hiemalis 'Showa-no-sake'
Camellia sasanqua 14 cultivars including:
'Apple Blossom'
'Briar Rose'
'Crimson King'
'Shishi-Gashira'
'Tago-no-tsuki'
Corylus colurna Turkish filbert
Crosus species & hybrids
Daphne Mezereum 'Alba' white February *Daphne*
Erica darleyinsis 'Alba'
Erica herbacea (carnea) 'King George'
'Ruby Glow'
'Springwood'
'Springwood Pink'
Garrya elliptica coast silktassel
Hamamelis macrophylla
mollis Chinese witchhazel
vernalis
prunus subhirtella 'Autumnalis' winter cherry
Rhododendron mucronulatum Korean rhododendron
Shepherdia argentea buffalo-berry
Viburnum bodnantense 'Dawn'
Viburnum Farreri (fragrans)
Viburnum Farreri 'Candidssimum'
Viburnum Tinus laurustinus

This is your Arboretum, kept alive by your support

We are pleased to welcome the following new members December 1, 1967 through March 18, 1968): *Sustaining*—Mrs. James B. Dodge, Lake Meridian Garden Club. *Annual*—M. Frank Backus, Mrs. Richard Broz, Mrs. Stephen F. Chadwick, Jr., Mrs. Foster H. Chapin, Mrs. L. S. Clark, Jr., Mrs. John Clarke, Mrs. J. D. Cooper, Mrs. Robert C. Dale, Mrs. James Dupar, John M. Eddy, James R. Ely, Mrs. R. H. Fleming, Prof. & Mrs. Robert L. Fletcher, Mrs. Archie French, Mrs. Peter Gallimore, Mrs. Henry B. Gardner, Jr., Mrs. John P. Glase, Mrs. John Hartman, Mrs. William Hirons, Mrs. J. Richard Johnston, Mrs. Ronald T. Kelly, Mrs. Marshall W. Knox, Mrs. Bruce R. Lippke, Mrs. Donald R. McVittie, Mrs. Marie Mueller, Mrs. John B. Mulder, Mrs. Earl H. Nanthrup, Mrs. Carl Henry Neu, Mrs. Emma R. Norris, Mrs. Robert V. Norton, Mrs. George Schuchart, L. V. Steck, Mrs. William Steele, Mrs. Alexander Sutton, Mrs. Bruce C. Walker, Mrs. J. H. Walker, Mrs. Robert Wm. Whitney, C. V. Zaser.

We are also grateful to the following who have increased their membership dues to: *Sustaining*—Miss Phyllis Cavender, Mr. & Mrs. Glen Hunt, A. Dan McCoy.

Some of Our Favorites ☆

☆ *Won't You Send Us Yours?*

EUPHORBIA WULFENII

The most spectacular shrub in my garden is technically an herbaceous perennial. With its two to four foot semi-woody canes, densely clothed in whorls of persistent, blue-green, narrow leaves, *Euphorbia wulfenii* functions as a shrub. The stems grow from the crown, however, taking two years to reach maturity, when the tip of each produces an immense globose raceme of chartreuse bracts; after the flowering is past, the stems lose their vigor and should be removed to give strength to the new shoots which are already rising in abundance.

Euphorbia wulfenii has no common name, although many members of its genus are known as "spurge". It is closely related to a group of smaller perennial euphorbias which bear similar chartreuse blossoms. Others of its more distant relatives are the woody but tender "crown of thorns" and the Christmas poinsettia. All have in common the fact that their inflorenscence depends for effect on colorful bracts which surround the inconspicuous true flowers. When their leaves are bruised or their stems cut, all euphorbias bleed a milky sap which can be irritating to the skin.

The species is supposed to be grown in full sun in relatively poor, dry soil. I find that such treatment makes a plant about two feet high but not as handsome as that which is presently flourishing in a well-manured bed near my dining room window. This one receives some afternoon sun, some rain, and a squirt from my garden hose whenever I water the plants on my terrace. This year it will have well over thirty flowering stalks, which will reach an approximate height of four feet.

The plant attracts my family's attention from the earliest days of winter, because on cold mornings the leaves fold down against the stems, making an excellent weather indicator. By the time breakfast is over, they are usually expanding again. In January the tips start to form roundish heads which bend over toward the sun. By late February they are once more erect and have assumed their ultimate form, but they continue to unfold until May when each raceme may be as large as five inches in diameter and eight inches tall.

In late June or July, the flowers have gone to seed. It is then that I remove the spent canes, extending the pruning over several days in order not to bleed the plant to death. A few will have produced secondary shoots from the base of the pedicles. I save one or two of these until August when the shoots are ready to root by cuttings. An occasional volunteer seedling will also appear.

My first *Euphorbia wulfenii* was purchased at the 1956 Arboretum Foundation Plant Sale, which has an annual supply from a generous donor. When it was five years old, the original plant perished—whether from excessive blooming or mistreatment I do not know. But by then I have begun to build a stock of rooted cuttings, which I supplement from time to time in order to assure a continuing supply of my favorite garden ornament.

Mrs. Giacomo Pirzio-Biroli

A Trail in the Olympics

(*Continued from Page 5*)

the mossy foliage, might be open on the area most exposed to the sun while the buds would still be tightly closed on the cooler portion of the same plant.

Here on the rolling but rocky surface of the two buck's horns we had found an insiring climax to our trek, amidst the treasures which we had come to see. Here we close our account in the rarefied atmosphere of spring, above the clouds which were sweeping up the valley of Heather Creek to the west of us, and in view of the snow laden ramparts of Mount Constance to the south.

Grow Your Own

(*Continued from Page 7*)

dry of water and nutrient before I realized the problem.

The following have had their first bloom three and one half years after sowing: carolinianum, kaempferi, davidsonianum, tephropeplum, pubescens, puralbum, and an unidentified species—possibly exquisitum. Wardii and degronianum are budded and will bloom four and a half years after sowing. This is not to imply that all sorts will bloom in this period of time, but that a gratifying number will.

Limited experiments last year with the Grow Lux Light gave rather dramatic results, indicating a growth rate of some two or three times that of seedlings in otherwise identical basement conditions. More careful experiments are being conducted this year, with check plants and test plants of some fifteen varieties.

It is highly desirable to grow seedlings on until they bloom, before giving them away. One might give away a horror, or the gem of the lot. Do not worry about having excess plants. They are valuable for gifts, door prizes, plant sales and auctions, or best of all, for swapping with other addicts. That is how I got the pink puralbum!

P.S. Let me say, in my own defense, that, while I freely admit to being a greedy, avaricious, hopeless collector, I'm not entirely without ethics. I took a few cutttings and gave the pink puralbum back to the donor.

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BOOK REVIEWS

THE ENDEMIC FLORA OF TASMANIA, part 1. Dr. W. Curtis, with 23 color plates by Margaret Stones; large qto., pp. 70, end maps, (Ariel Press, London, England, 1967); price approximately $45.00.

This is a remarkable, beautiful, and likewise valuable book—remarkable because it has been conceived and sponsored by a private individual, Lord Talbot de Malahide, of Dublin, Ireland, and not by a government department or a botanical or horticultural institution, but by an amateur in both these fields, though of long and wide experience in at least the latter.

It is also remarkable because it illustrates, from hand colored drawings, the highly varied and often most attractive plants of an Australian state which have seldom or never previously been publicly displayed. The beauty of these plates and the quality of their reproduction (done in West Germany) speak for themselves. The artist, Miss Stones, is a native of Australia, now working at the Royal Botanic Gardens, Kew, London, as an illustrator for the old and famous **Botanical Magazine,** so that botanical accuracy is assured.

The work is especially valuable for these color plates of plants which are very rarely, with a few exceptions, seen in cultivation; many of them, however, should be tried over wider areas and in more countries with similar climates to that of Tasmania than they seem to have been; perhaps the difficulty of obtaining seeds or other material for propagation is one of the major problems in doing so. In addition, there is the information contained in the summary on the **Flora of Tasmania** by Sir Gorge Taylor, Director of the Royal Botanic Gardens, and in the **Introduction** by Dr. Winifred M. Curtis wherein she describes the geological history, topography, climate—which appears to have many features in common with that of Western Washington,—and the types of vegetation found in different areas and plant communities, from the rain forests of the west to the mountains of the central plateau. Dr. Curtis, a member of the faculty of the University of Tasmania, has also been responsible for the descriptions accompanying each plate, often highly informative, as for example **Eucalyptus tasmanica** and **Prionotes cerinthoides,** forming a happy blend of botanical details and personal observation of living plants in their natural haunts; others, regrettably, are all too brief, for example the extraordinary **Ewartia catipes,** the small **Eucryphia Milliganii,** some of the **Olearia** species. A little more information about their plant associations, and the kind of habitats they are found in would be welcomed by would-be cultivators. Perhaps also Lord Talbot de Malahide would add notes where possible from his own experiences with them in Ireland, or elsewhere in gardens outside Australia.

In this first volume of the three projected there are twenty three color plates depicting thirty seven species belonging to thirteen families. No particular order is followed in their presentation, except that species of one genus are placed together,—**Helichrysum,** six species, **Olearia,** five, and **Richea,** five, are some of the larger groups. The availability of material has determined the inclusion of each, and as Lord Talbot points out in his opening **Genesis,** it will take more effort to obtain specimens in the later stages of the work. Only three of the total number illustrated are growing in our Arboretum—**Clematis gentianoides, Eucryphia lucida,** and **Pomaderris elliptica;** the last, however, has to be moved into a greenhouse each winter and does not enjoy this procedure. Many of the remainder would appear to be potentially valuable assets to gardens in this region if they could be acquired and then successfully cultivated.

Lord Talbot, Dr. Curtis, and Miss Stones have done a great service to both Tasmania, in thus advertising so attractively its wealth of plant life, as well as to horticulture in temperate countries. Let us sincerely hope that as a result of their combined efforts all of these plants can be preserved in their native habitats and that many of them can be introduced to and grown in the gardens of other lands where their unusual forms and particular characters can be enjoyed and appreciated.

B.O.M.

HARDY FOLIAGE PLANTS by Richard Gorer. W. H. & L. Collingridge, Ltd., London, 1966. 215 pp., illus. 35S.

This book discusses the principles of plant groupings, based upon characteristics of foliage, designed to develop the most pleasing year-round effects in features of garden and landscape. Apart from the interest and beauty inherent in varied characteristics of plant foliage, its form and texture provides a background for the more spectacular flowers and fruit, and either accents or frames desired vistas.

With such thoughts in mind, the author deals with various broad groups of plants in six chapters. These chapters relate to conifers and other evergreens, deciduous trees and shrubs, herbaceous vegetation, alpines, and grasses and ferns. Information in the text is enhanced by a wide variety of attractive photographs.

Though information in this book is related primarily to the requirements of English conditions, gardeners in the Puget Sound Region of the Pacific Northwest will find many ideas applicable to the local scene. A number of plants common in parks and gardens of this region—both native and introduced—receive more than passing attention.

C. Frank Brockman

Unusual and Dwarf Conifers at the U.S. Nat'l. Arboretum

(*Continued from Page 19*)

symmetrical slow-grower with beautiful blue-gray leaves is 'Montgomery'. The Gotelli plant is an original from the Montgomery collection. Probably the bluest and most beautiful of all Coliorado Spruces is the vigorous, pyramidal 'Hoopsii'. Another striking pyramidal and compact form is 'Moll'.

Among the pines (*Pinus*), superlative dwarfs are to be found in the Mugos (*mugo*), the Swiss Stone Pine (*cembra*), the Scots Pine (*sylvestris*) and our native White Pine (*strobus*). One cushion-shaped and very compact Mugo is 'Hesse'. It has rich, dark green and somewhat contorted

needles. The Slavin dwarf Mugo ('Slavinii') was selected in Rochester, New York for the park system and raised from seed obtained in Bulgaria. The plant was named in honor of B. H. Slavin, a famous plantsman and the park superintendent. It is a dense, mat type with crowded, dark bluish-green needles. 'Gnom' become a dense, globose shrub with very crowded dark green leaves. The mother plant of 'Gnom' in the Netherlands, after 35 years, is a perfectly uniform globe of 12 feet in height and breadth. The Swiss Mountain Pine 'Pygmaea' is an exquisite item with delicate, somewhat pendulous, closely adpressed branches bearing short, curved needles. The Scots Pine also has a 'Pygmaea' which forms a low, dense, rounded plant, and has very long, stiff and twisted needles, and reddish branches. Another very desirable globose form of the Scots Pine is 'Globosa Viridis' with crowded, short branches and long, dark green, twisted needles.

Many feel the finest cultivars of the White Pine are 'Umbraculifera' and 'Pumila'. 'Umbraculifera' is a dense, broad, uniformly umbrella-shaped shrub bearing long needles in heavy and drooping clumps. The globose 'Pumila' grows at the slow rate of only about two inches a year and has silvery green and twisted needles.

The other pines and their slow-growing forms displayed in the Gotelli collection are: White Bark Pine (*albicaulis*), native to the western United States and British Columbia; Bristle Cone Pine (*aristata*), from the western United States; Knobcone Pine (*attenuata*), from Oregon to Mexico; Mexican White Pine (*ayacahuite*), from the southwestern United States through Mexico to Central America; Balfour's Pine (*balfouriana*), from California; Nutpine (*cembroides*), from the southeastern United States and Mexico; Contorted Pine (*contorta*), from the Western United States to Alaska; Japanese Red Pine (*densiflora*); Limber Pine (*flexilis*), from the western United States and Mexico; the Korean Pine (*koraiensis*); Bhutan or Himalayan Pine (*griffithii*); Western White Pine (*monticola*); Black Pine (*nigra*), from Europe; Western Yellow or Ponderosa Pine (*ponderosa*); Pitch or Southern Pine (*palustris*), from the Eastern United States to Florida and Texas; Japanese White Pine (*parviflora*); Dwarf Siberian or Japanese Stone Pine (*pumila*), a superior, naturally slow-grower occuring native from Japan to Siberia and Manchuria; Balkan or Macedonia Pine (*peuce*); Schwerin's Pine (x *schwerinii*), a hybrid between the Himalayan and Eastern White Pine; Digger Pine (*sabiniana*), from California; Japanese Black Pine (*thunbergii*); Eastern Pitch Pine (*rigida*); Bosnian Red Cone Pine (*heldreichii* var. *leucodermis*) from Italy, Albania and Yugoslavia; Lacebark, Paperbark or Bunge's Pine (*bungeana*), especially noted for its beautiful bark coloration, Armand's Pine (*armandii*), Masson Pine (*massoniana*) and Chinese or Tabular Pine (*tabulaeformis*), all from China.

'Hornibrookiana' of Black Pine is a particularly excellent form with low, compact, erect branches covered with lustrous dark green and stiff needles. It was discovered as a witches broom in Seneca Park in Rochester, New York, by B. H. Slavin.

Among the English Yews (*Taxus baccata*), the slow-growing, erect, fastigiate 'Standishii' is particularly spectacular. 'Pygmaea' has short, glossy, light green leaves and is effective as a densely branched, conical shrub not more than a foot high. 'Amersfoort', with its stiff, erect stems and very curious, almost box-like leaves, was recently called the most unusual English Yew in the world. Several dwarf and slow-growing forms of the Canada Yew (*canadensis*) and the Japanese Yew (*cuspidata*) are also available for scrutiny in the Gotelli collection at the National Arboretum.

The miniature forms of the American Arborvitae or White Cedar (*Thuja occidentalis*) are first-rate, easily cultivated and plentiful in the trade. 'Minima' is an extremely slow-growing, narrow pyramid with tufted sprays of foliage. The partially

juvenile foliage and uniformly globose habit of up to 3 feet of 'Ohlendorffii' are especially appealing. One of the best dwarf color forms is 'Rheingold'. At maturity, it is a broad and dense, globular shrub with yellowish foliage which becomes rosy in the fall. 'Hetz Midget' is an American introduction that produces a short, tight, dark green globe. The more robust 'Indomitable' comes from the Netherlands and produces an attractive, irregular shrub with dark green foliage turning reddish in the winter. Similar to 'Pumila', and one of the best dwarf Arborvitaes, is 'Little Gem', having a flattened, globose form that is broader than high. Its foliage is rich, deep green and the twisted and curved sprays are held closely together at all angles.

'Dwarf Greenspike' of the Oriental Arborvitae (*orientalis*) is an American introduction from Oklahoma. It is slow-growing, pyramidal, and has soft, juvenile, juniper-like foliage. The smallest form of the species probably is 'Minima'. It grows less than an inch a year and produces a globose plant having erect, heath - like branches. Its foliage is bluish-green in the summer and yellowish in the winter. There are many memorable color and unusual growth forms of the Western Arborvitae (*plicata*) which can be heartily recommended. The Korean Arborvitae (*koraiensis*) is also on hand in the Gotelil collection.

The Canada or Eastern Hemlock (*Tsuga canadensis*) is a stately tree in its usual form, and has many dwarf, pygmy and weeping forms. Most are American selections and introductions. Many enthusiasts the world over claim these are the Princesses of Beauty among dwarf conifers. With minor exception, they all command high praise for ornamental purposes and diversity of form and texture. They range in size and shape from 2-4 inch mounds or creepers, to 2-4 foot erect pyramids tiered and tufted cones, columns, globes or uniform spheres, to 10-15 or even 25 foot weepers with uniform or irregular branching and open or dense umbrella-shaped crowns, to 2-6 fot spreading, fan-like or flat-topped, broader than tall shrubs with ascending or erect branches and branch tips erect or pendulous. Among many, 'Minima', 'Minuta', 'Bennett', 'Everett Golden', 'Ruggs', 'Cinnamomea', 'Von Helms', 'Gable's Weeping', 'Kingsville', 'Taxifolia', 'Hussii', 'Hicks', 'Vermeulen's Pyramid', 'Stranger', and the famous, enchanting but variable 'Pendula', are all exceptionally distinguished as individual specimen plants or for landscape effect. 'Everett Golden' has golden yellow foliage in the summer that becomes bronzy in the fall. The dense, cinnamon colored hairs on the shoots of 'Ruggs' and 'Cinnamomea' are a unique and engaging feature.

Also exhibited in the Gotelli collection are the Carolina Hemlock (*caroliniana*), Northern Japanese Hemlock (*diversifolia*), Mountain Hemlock (*mertensiana*) from Western North America, and the Southern Japanese Hemlock (*sieboldii*), as well as several of their miniature and slow-growing selections.

The Gotelli collection of dwarf and slow-growing conifers is a perpetuating legacy to the U.S. National Arboretum and to the nation. It is now one of the most popular attractions and focal points in the Arboretum and will continue to gain national and international recognition and prestige as the foremost collection of its type in the United States, or possibly, the world.

This listing does not constitute any official endorsement of the nurseries or provide any guarantee as to the immediate availability, quality or correct identity of the plants listed. The list gives sources that offer large selection of dwarf and slow-growing conifers, some of which are their own selections and introductions.

Alpenglow Gardens
Michaud & Company
13328 King George Highway
North Surrey, B.C., Canada

Appalachian Nurseries
Waynesboro, Pennsylvania 17268

Brimfield Gardens Nursery
245 Brimfield Road
Wethersfield, Conn. 06109

Carroll Gardens
Westminster, Maryland 21157

Christensen's Nursery Co.
935 Old County Road
Belmont, California 94002

Ness' Nurseries
Cedarville, New Jersey 08311

Kingsville Nurseries
Kingsville, Maryland 21087

Mayfair Nurseries
R.D. 2, Nichols, New York 13812

Mitsch Nursery
Aurora, Oregon 97002

Rainier Mt. Alpine Gardens
2007 South 126th
Seattle, Wash. 98168

Raraflora
F. & H. Bergman
1195 Stump Road
Feasterville, Pennsylvania 19047

Ross & Ross Nursery
Paradise Valley
Cresco, Pennsylvania 18326

Joel W. Spingarn
1535 Forest Ave.
Baldwin, New York 11510

Tingle Nursery Co.
Pittsville, Maryland 21850

Verkade's Nursery, Inc.
262 Black Oak Ridge Road
Wayne, New Jersey 17472

John Vermeulen & Son., Inc.
Neshanic Station, New Jersey 08853

Watnong Nursery Morris Plains, New Jersey 07950

Arboretum Weather Record - 1967

		°Temperature		+ Sunshine	
Month	*Rain (inches)	Highest	Lowest	Hours	% Possible
January	9.53	56°F.	29°F.	47.5	17%
February	2.25	60°F.	30°F.	126.9	44%
March	3.78	57°F.	27°F.	147.3	40%
April	3.18	66°F.	31°F.	251.3	61%
May	0.75	84°F.	39°F.	295.1	63%
June	1.49	92°F.	47°F.	298.3	63%
July	0.08	90°F.	48°F.	342.6	71%
August	0.00	96°F.	48°F.	328.0	74%
September	1.60	92°F.	45°F.	273.9	73%
October	5.44	71°F.	38°F.	96.4	29%
November	2.29	62°F.	29°F.	88.5	32%
December	6.75	54°F.	22°F.	39.1	15%
Total	37.14			2334.9	
Average	39.45				

Notes

Lowest recorded temperature for the year, Dec. 14, 22°F.
Highest recorded temperature for the year, Aug. 16, 96°F.
Greatest 24 hour rainfall, Jan. 19, 1.63 inches
Number of days with minimum temperature below 32°F.–32
Number of days with minimum temperatures below 30°F.–9
Number of days with maximum temperatures above 90°F.–9
Number of days with maximum temperatures below 32°F.–0
Last recorded frost in spring; April 15, (31°F.)
First recorded frost in fall; November 5, (32°F.)

*Measured at station west of greenhouse in Arboretum.

+Recorded at U. S. Weather Bureau Station, Seattle-Tacoma Airport

Some Books Added to the Arboretum Library in 1967

1. **OLD BOOKS** (or color plates)

Figures of the Most Beautiful, Useful and Uncommon Plants, by Philip Miller, vols. 1 and 2, (London, 1760). 300 copper plates. Gift of Mr. Prentice Bloedel.

Salicum Woburnense, or **A Catalogue of Willows,** by J. Forbes for the Duke of Bedford (1829). 140 color plates. From Arboretum Foundation funds.

Iconographie du Genre Camellia, by L. Berlese, (Paris, c. 1840); 13 original engraved plates by Oudet. Gift of Arboretum Foundation.

Icones Plantarum, by Sir W. J. Hooker, vols. 1, 2, (New Series), (London, 1842-43). With 200 plates. From Arboretum Foundation funds.

Les Chenes de l'Europe et de l'Orient, by T. Kotschy, (Paris, 1864). 40 color plates. From Arboretum Foundation funds.

2. **NEW OR RECENT WORKS**

Iconografia Selecta da Flora Portuguesa, by Goncalo Sampaio, (Lisbon, 1949).

Camellia Trail, by E. G. Waterhouse & Paul Jones, (Sydney, Australia, 1952).

Berried Treasure, by F. Kingdon-Ward; (Ward, Locke & Co., Ltd., London & Melbourne, 1954).

Bamboo in the United States, by R. A. Young & J. R. Haun; (U.S. Dept. of Agriculture, handbook #193, 1961) Gift of Mr. A. W. Saxton, Corvallis, Oregon.

The Eucalypts, Botany, Cultivation, Chemistry and Utilization, by A. R. Penfold and J. L. Willis, (London, 1961).

The Japanese Art of Miniature Trees and Landscapes, by Y. Yoshimura & G. M. Halford, (C. E. Tuttle Co., Rutland, Vt., 1963) Donated by Mrs. Edna Donoghue

New Zealand Flowers and Plants in Colour, by J. T. Salmon, (Auckland, N.Z., 1963).

Spring Flora of Sikkim Himalaya, by Japanese members of the Indo-Japanese botanical expedition—in 1960; (Osaka, 1963).

Genera of Flowering Plants, by J. Hutchinson, vols. 1 & 2; (Clarendon Press, Oxford, 1964, 1967).

Gardening by the Sea, by Daniel J. Foley; (Chilton Books, Philadelphia, 1965). Gift of Unit #4, Lake Washington Garden Club, in memory of Mrs. A. T. Lee.

Dictionary of the Flowering Plants and Ferns, by J. C. Willis, 7th edition, revised by H. K. Airy Shaw; (Cambridge, Eng., 1966).

The Gardener's Guide to Pruning, by H. Fraser, (Collingridge, London, 1966).

A Handbook of Coniferae and Ginkgoaceae, by W. Dallimore & S. G. Harrison; (4th revised edition, London, 1966)

Rhododendron and Camellia Yearbook 1967, Royal Horticultural Society, London, 1966)

The American Camellia Yearbook, 1968, edited by Joseph H. Pyron, (American Camellia Society, Tifton, Ga., 1967)

The Endemic Flora of Tasmania, pt. 1, by Dr. W. Curtis & Margaret Stones; (Ariel Press, London, 1967). Given by the Faculty Wives Garden Club in memory of Dr. Henry Schmitz.

Irish Gardens, by Edward Hyams & W. McQuitty; (Macmillan Co., New York, 1967) Gift of Arboretum Unit #27

Key to the Families of Flowering Plants of the World, by J. Hutchinson (Clarendon Press, Oxford, 1967)

The Rothschild Rhododendrons, by C. E. Lucas Phillips & Peter N. Barber (Cassell & Co. Ltd., London, 1967) Gift of Arboretum Unit #8.

The Rhododendron Handbook, 1967, Part 1, Species; Royal Horticultural Society, London, (1967)

3. **DONATED** (with others)

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The Story of Gardening, by Richardson Wright, (1934)

4. **SOME PUBLICATIONS RECEIVED FROM EUROPEAN INSTITUTIONS**

Dendrologia-Acta Musei Silesiae (Series C), pts. IV, V, 1965, '66; Novy Dvur u Opavy, Czechoslovakia

Dondroflora Arboretum Mlynany; Ing. F. Bencat, (Bratislava, Czechoslovakia, 1967)

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List of Trees and Shrubs of the Botanical Garden of the University of Warsaw, (Warsaw, Poland, 1962)

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